Remarks

In view of the above amendments and the following remarks, reconsideration of the outstanding office action is respectfully requested.

It is rare that a single material will have all (or even several) of the typically desired characteristics for a particular application. A classic example is that strong materials are typically heavy. Another example is that the best thermal insulators (e.g., solid aerogels) are typically rigid, fragile, and have attendant low density. Such issues lead to classical "design trade-offs" and encourage the development of new materials at the *microscopic* level. Alternately, materials can be processed or treated at the *macroscopic* level to enhance desirable properties while attempting to minimize the undesirable "side effects" of the process or treatment. Although the process or treatment is at the *macroscopic* level, the resultant changes are typically at the *microscopic* level. A classic example is heat treating metals to increase hardness, usually at the expense of increased brittleness.

Thus, it is well known that one specific material does not typically possess all of the desired and/or required characteristics for a particular application. For example, high strength is often at the expense of high weight, high density, high rigidity and incompressibility. Another example is thermal insulation, which has low thermal conductivity, typically at the expense of compressibility; which, in turn, lowers its effective thermal resistance. Composite materials attempt to alleviate this by combining materials with desirable properties for a particular application. There usually remain, however, undesirable "side-effects" (design trade-offs). To illustrate further, a comparison is made between two types of thermal insulation, namely, foamed neoprene and syntactic foam.

Foamed neoprene is currently used for underwater diver thermal insulation. It is a good insulator because it contains small "pockets" of gas trapped in closed internal cells. Since gas has a low thermal conductivity, foamed neoprene is a good insulator as long as the closed internal cells retain their integrity, including their volume of gas. However, as a diver goes to increasing depth in water, the associated and inevitable increase in local hydrostatic pressure compresses the gas trapped in the closed internal cells. This reduces their volume and the foamed neoprene is said to "go flat." Since the thermal resistance is the thickness divided by the thermal conductivity, this causes dual disadvantages inasmuch as its thickness is reduced and its effective thermal conductivity is increased. That is to say, its insulating capability is reduced (often unacceptably) by two mechanisms.

Syntactic foam is a composite material composed of a matrix material and a filler material. One use of syntactic foam is for thermal insulation in high-pressure environments, such as thermally insulating deep-ocean oil pipelines. For this application, the matrix material is typically plastic and the filler material is typically hollow micro- and/or macro-spheres. The hollow micro- and/or macro-spheres may be gas-filled or evacuated. The matrix material serves to hold-in-place the relatively low thermal conductivity hollow micro- and/or macro-sphere filler material. As the volume fraction of the filler material increases, the effective thermal conductivity of the syntactic foam decreases, i.e., the effectiveness of the insulation increases. This is done, however, at the expense of increased stiffness. This increased stiffness is a distinct disadvantage of syntactic foam in that it does not conform well to contours, unless it is molded-in-place. Furthermore, as the volume fraction of lower conductivity inclusions is increased, to increase its insulation capability, current syntactic foam suffers from a decrease in flexibility. In other words, the better the insulation, the stiffer it becomes. This makes it unsuitable for insulation when flexibility is required—such as for insulating contours, clothing, and underwater diver thermal protection. The differences in thermal resistance between foamed neoprene and syntactic foam are even more striking. They would amount to about a six-fold advantage of the syntactic foam at depth of 350 feet of sea water. Currently, the stiffness of syntactic foam makes it impractical for use in garments such as dive suits.

The present invention is directed to overcoming these and other deficiencies in the art.

Claims 47-59 and 61-68 have been canceled without prejudice as being directed to non-elected subject matter. Applicants reserve the right to pursue the subject matter of the non-elected claims in one or more related applications. Claim 29 has been canceled and claims 1, 18, 20, 30-36, and 60 have been amended, so that claims 1-28, 30-46, and 60 are now pending.

The rejection of claims 18-27 under 35 U.S.C § 112 (2nd para.) for indefiniteness is respectfully traversed in view of the above amendments to claims 18 and 20.

The rejection of claims 1, 2, 7, 13, and 60 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,633,004 to Heitz et al. ("Heitz") is respectfully traversed in view of the above amendments and the following remarks. Claims 1 and 60 have been amended to incorporate the limitations of claim 29. Because claim 29 is not subject to this rejection based on Heitz, applicants respectfully submit that the rejection is improper and should be withdrawn.

The rejection of claims 1-7, 9, 11-13, 18, and 60 under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,451,231 to Harrison et al. ("Harrison") is respectfully traversed in view of the above amendments and the following remarks. Because claims 1 and 60 have been amended to incorporate the limitations of claim 29, and because claim 29 is not subject to this rejection based on Harrison, applicants respectfully submit that this rejection is improper and should be withdrawn.

The rejection of claims 1, 2, 13, 46, and 60 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,569,513 to Fidler et al. ("Fidler") is respectfully traversed in view of the above amendments and the following remarks. Because claims 1 and 60 have been amended to incorporate the limitations of claim 29, and because claim 29 is not subject to this rejection based on Fidler, applicants respectfully submit that this rejection is improper and should be withdrawn.

The rejection of claims 1, 2, 7, 9, 10, 13, 14, 46, and 60 under 35 U.S.C. § 102(b) as anticipated by WO 99/57182 to Bertrand et al. ("Bertrand") is respectfully traversed in view of the above amendments and the following remarks. Because claims 1 and 60 have been amended to incorporate the limitations of claim 29, and because claim 29 is not subject to this rejection based on Bertrand, applicants respectfully submit that this rejection is improper and should be withdrawn.

The rejection of claims 1-3, 7-10, 12, 18, 19, 44, and 45 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 3,660,849 to Jonnes et al. ("Jonnes") is respectfully traversed in view of the above amendments and the following remarks. Because claim 1 has been amended to incorporate the limitations of claim 29, and because claim 29 is not subject to this rejection based on Jonnes, applicants respectfully submit that this rejection is improper and should be withdrawn.

The rejection of claims 8, 10, 14-17, and 19-43 under 35 U.S.C. § 103(a) for obviousness over Harrison is respectfully traversed.

Harrison describes a two-component type structural foam for supporting or stiffening various parts (col. 1, lines 30-36, and col. 2, lines 57-58). "The foam is particularly intended as a reinforcement or stiffener for plastic parts" (Harrison at col. 2, lines 13-14). Further, Harrison states that "[i]n its broad aspect...the invention may be practiced for reinforcing or stiffening parts made of other types of materials, including metal (such as steel) and fiberglass" (col. 2, lines 14-17).

The U.S. Patent and Trademark Office ("USPTO") has taken the position that Harrison teaches the claimed composite insulation material of the present invention, "*except* for the incisions in the surface layer, thickness thereof and properties thereof" (Office Action, mailed August 10, 2005, at page 4) (italics added). In view of these acknowledged deficiencies, the USPTO points out that Harrison describes the surface layer of the structural foam as having corrugations or any surface pattern. Based on this disclosure, the USPTO asserts that it would have been obvious for one of ordinary skill in the art to form incisions in the surface of the structural foam of Harrison to yield the composite insulation material of the present invention. Applicants respectfully disagree.

A proper *prima facie* showing of obviousness requires the USPTO to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated the skilled artisan to combine or modify references. *See In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the USPTO must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. *See Amgen v. Chugai Pharm. Co.*, 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. *See In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). Application of these standards to the present invention demonstrates that the USPTO has failed to establish a *prima facie* case of obviousness for several reasons.

Independent claim 1 (from which rejected claims 8, 10, 14-17, and 19-43 ultimately depend) has been amended to incorporate the limitations of claim 29. In particular, claim 1 has been amended to now recite that the claimed "composite insulation material has opposed first and second surfaces and comprises a plurality of incisions and/or indentations formed into the first surface and/or the second surface, or extending between the first and second surfaces." It is clear from the present specification that these incisions and/or indentations are stress relief patterns that serve to overcome the ***disadvantage of stiffness*** of syntactic foams (*see* specification at page 4, lines 9-12). In contrast, nowhere does Harrison teach or suggest modifying the structural foam of Harrison—e.g., by adding incisions, indentations, or other modifications—in order to make the structural foam more flexible. Instead, as mentioned hereinabove, the object of the structural foam of Harrison is to reinforce and stiffen parts (e.g., plastic parts), ***not*** to add more flexibility to the parts. The "corrugations" or "other surface pattern" mentioned in Harrison (and used by the USPTO to support this rejection) relate to the use of the structural foam in a truck bed (e.g., in a pickup

truck bed), and have nothing to do with adding flexibility to the material. Thus, the skilled artisan would not have been motivated by Harrison to decrease the stiffness of the structural foam in order to make it more flexible. Further, applicants respectfully submit that Harrison's mention of "corrugations" and "other surface pattern" cannot be equated with the stress relief patterns (i.e., the incisions and/or indentations) of the present invention. In addition, unlike the composite insulation material of the present invention, the structural foam disclosed in Harrison is not described as being useful for thermal insulation. In fact, nowhere does Harrison even mention or suggest that its structural foam has thermal insulation properties.

For the reasons discussed above, applicants respectfully submit that the obviousness rejection of claims 8, 10, 14-17, and 19-43 based on Harrison is improper and should be withdrawn.

In view of all of the foregoing, applicants submit that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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